Notice No.1

Rules and Regulations for the Construction and Classification of Ships for the Carriage of Liquefied Gases in Bulk, July 2021

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

Please note that corrigenda amends to paragraphs, Tables and Figures are not shown in their entirety.

Issue date: November 2021

Amendments to	Effective date	IACS/IMO implementation (if applicable)
Chapter 5, Section 5	1 January 2022	1 January 2022
Chapter 7, Section 7	1 January 2022	1 January 2022
Chapter 8, Section 8	1 January 2022	1 January 2022
Chapter 13, Section 13	1 January 2022	1 January 2022
Chapter 18, Section 18	1 January 2022	1 January 2022

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Chapter 5
Process Pressure Vessels and Liquid, Vapour and Pressure Piping Systems

■ *Section 5.4*
Design Pressure

5.4.4 The design pressure of the outer pipe or duct of gas fuel systems shall not be less than the maximum working pressure of the inner gas pipe. Alternatively, for gas fuel piping systems with a working pressure greater than 1 MPa, the design pressure of the outer duct shall not be less than the maximum built-up pressure arising in the annular space considering the local instantaneous peak pressure in way of any rupture and the ventilation arrangements.

LR 5.4-01 The expression ‘design pressure of the outer pipe or duct’ in 5.4.4 is either of the following:
(a) the maximum pressure that can act on the outer pipe or equipment enclosure after the inner pipe rupture as documented by suitable calculations taking into account the venting arrangements; or
(b) for gas fuel systems with inner pipe working pressure greater than 1 MPa, the ‘maximum built-up pressure arising in the annular space’, after the inner pipe rupture, which is to be calculated in accordance with paragraph 9.8.2 of the *Rules and Regulations for the Classification of Ships using Gases or other Low-flashpoint Fuels*.

■ *Section 5.6*
Cargo transfer arrangements

5.6.6 Cargo filters

The cargo liquid and vapour systems shall be capable of being fitted with filters to protect against damage by extraneous objects. Such filters may be permanent or temporary, and the standards of filtration shall be appropriate to the risk of debris, etc., entering the cargo system. Means shall be provided to indicate that filters are becoming blocked, and to isolate, depressurize and clean the filters safely.

LR 5.6-01 For fixed inline filter arrangements and portable filter installations (where provided with a dedicated filter housing piping) means shall be provided to indicate that filters are becoming blocked and filter maintenance is required.

LR 5.6-02 Where portable filters for fitting to manifold presentation flanges are used without dedicated filter housings, and these can be visually inspected after each loading and discharging operation, no additional arrangements for indicating blockage or facilitating drainage are required.

■ *Section 5.12*
Materials

5.12.3 Cargo piping insulation system

5.12.3.1 Cargo piping systems shall be provided with a thermal insulation system as required to minimize heat leak into the cargo during transfer operations and to protect personnel from direct contact with cold surfaces.

LR 5.12-01 Surfaces of cargo piping systems which personnel are likely to contact under normal conditions shall be protected by thermal insulation, with the exception of the following examples:
(a) surfaces of cargo piping systems which are protected by physical screening measures to prevent such direct contact;
(b) surfaces of manual valves having extended spindles that protect the Operator from the cargo temperature; and
(c) surfaces of cargo piping systems whose design temperature (to be determined from inner fluid temperature) is above minus 10°C.

■ *Section 5.13*
Testing requirements

5.13.1 Type Testing of Piping Components

5.13.1.1 Valves

Each type of valve intended to be used at a working temperature below -55°C shall be subject to the following type tests:

.1 each size and type of valve shall be subjected to seat tightness testing over the full range of operating pressures for bi-directional low and temperatures, at intervals, up to the rated design pressure of the valve. Allowable leakage rates shall be to the requirements of the Administration or recognized organization acting on its behalf. During the testing, satisfactory operation of the valve shall be verified;

.2 the flow or capacity shall be certified to a recognized standard for each size and type of valve;

.3 pressurized components shall be pressure tested to at least 1.5 times the rated pressure; and

.4 for emergency shutdown valves, with materials having melting temperatures lower than 925°C, the type testing shall include a fire test to a standard acceptable to the Administration.

LR 5.13-01 To satisfy the requirements of 5.13.1.1, for valves fitted to cargo and process piping systems, each size and type of valve is to be approved and the required prototype testing is to include a hydrostatic test of the valve body at a pressure equal to 1,5 times the design pressure, and cryogenic testing consisting of valve operation or safety valve set pressure, and leakage verification. In addition, for valves other than safety valves, a seat and stem leakage test at a pressure equal to 1,1 times the design pressure is to be conducted. Prototype testing for all valves to the minimum design temperature or lower and to a pressure not lower than the maximum design pressure for the valves is to be completed to the satisfaction of the LR Surveyor.

LR 5.13-02 For pressure relief valves (PRVs) that are subject to paragraph 8.2.5 of the IGC Code, the flow or capacity of each type of valve is to be certified by the Administration or recognised organisation acting on its behalf; for other types of valves, the manufacturer is to certify the flow properties of the valves based on tests carried out according to recognised standards.

Existing paragraphs LR 5.13-02 to LR 5.13-06 have been renumbered LR 5.13-03 to LR 5.13-07.

5.13.2 System testing requirements

5.13.2.4 In double wall gas-fuel piping systems, the outer pipe or duct shall also be pressure tested to show that it can withstand the expected maximum pressure at gas pipe rupture.

LR 5.13-07 The expression ‘maximum pressure at gas pipe rupture’ in 5.13.2.4 is the maximum pressure to which the outer pipe or duct is subjected after the inner pipe rupture and for testing purposes it is the same as the design pressure used in 5.4.4.

Chapter 7

Cargo Pressure/Temperature Control

■ *Section 7.2*

Design of systems

LR 7.2-05 The thermal insulation properties and design arrangements of the piping insulation are to be taken into consideration when calculating the heat balance of the containment system and capacity of the pressure/temperature control system.

Chapter 8

Vent Systems for Cargo Containment

■ *Section 8.4*

Sizing of pressure relieving system

8.4.1 Sizing of pressure relief valves for cargo tanks

8.4.5 To ensure stable PRV operation, the blow-down shall not be less than the sum of the inlet pressure loss and 0.02 MARVS at the rated capacity.

LR 8.4-02 Sizing of pressure relief valves for hold and interbarrier spaces

LR 8.4-03 The relieving capacity formula given in paragraph LR 8.4-09 is developed for interbarrier spaces surrounding independent type A cargo tanks.

LR 8.4-04 The relieving capacity of pressure relief devices of interbarrier spaces surrounding independent type B cargo tanks may be determined on the basis of the method given in paragraph 8.4-09; however, the leakage rate is to be determined in accordance with section 4.7.2.

LR 8.4-05 The relieving capacity of pressure relief devices for interbarrier spaces of membrane and semi-membrane tanks is to be evaluated on the basis of the specific membrane/semi-membrane tank design.

LR 8.4-06 The relieving capacity of pressure relief devices for interbarrier spaces adjacent to integral type cargo tanks may, if applicable, be determined as for independent type A cargo tanks.

LR 8.4-07 Sizing

LR 8.4-08 The combined relieving capacity of the pressure relief devices for interbarrier spaces surrounding independent type A cargo tanks where the insulation is fitted to the cargo tanks may be determined by the following formula:

$$Q_{sa} = 3{,}4 * A_c \frac{\rho}{\rho_v}\sqrt{h}$$

Q_{sa} = minimum required discharge rate of air at standard conditions of 273,15 K and 1,013 bar (m^3/s)
A_c = Design crack opening area (m^2)

$$A_c = \frac{\pi}{4}\delta * l$$

δ = maximum crack opening width (m)
δ = 0,2t (m)
t = thickness of tank bottom plating (m)
l = design crack length (m) equal to the diagonal of the largest plate panel of the tank bottom, *see Figure LR 8.2 Design crack* below.
h = max liquid height above tank bottom plus 10 x MARVS (m)
r = density of product liquid phase (kg/m^3) at the set pressure of the interbarrier space relief device
r_v = density of product vapour phase (kg/m^3) at the set pressure of the interbarrier space relief device and a temperature of 273,15 K
MARVS = max allowable relief valve setting of the cargo tank (bar)

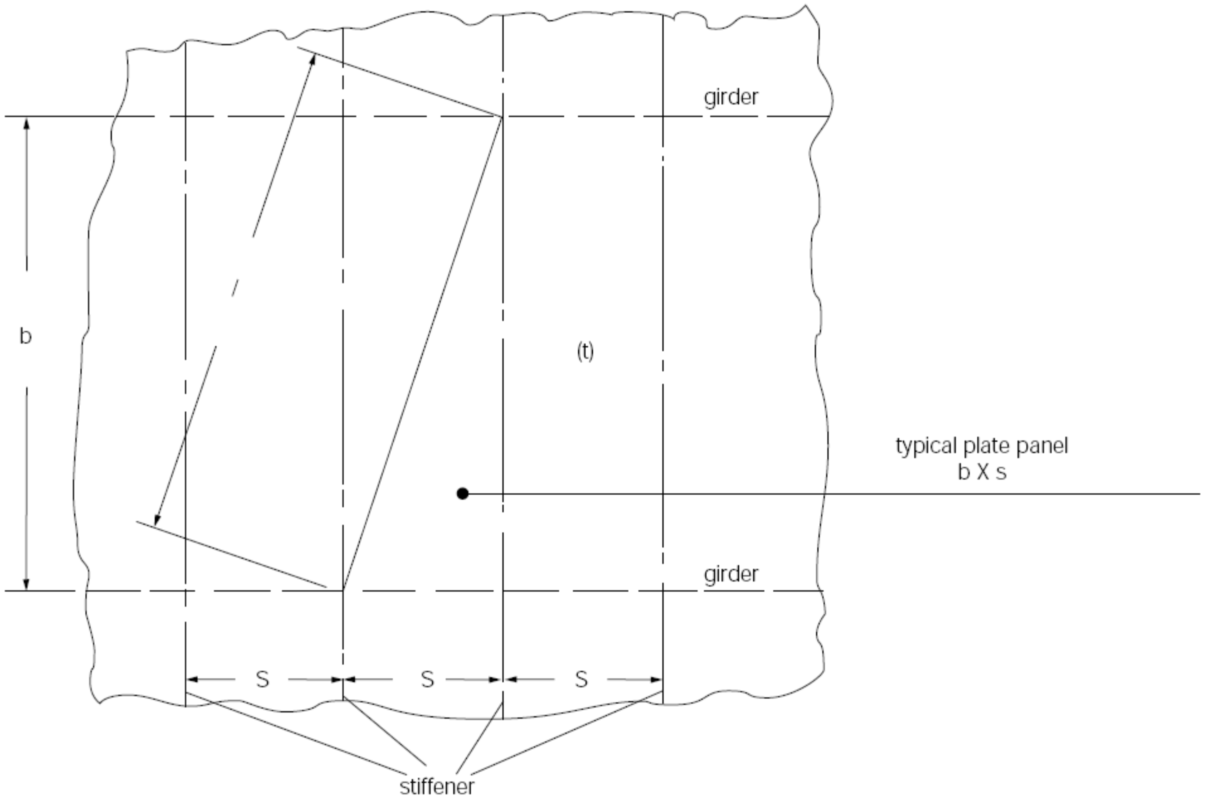

Figure LR 8.2 Design crack

Chapter 13
Instrumentation and Automation Systems

■ *Section 13.6*
Gas detection

13.6 Gas detection

13.6.4 Where indicated by an "A" in column "f" in the table of chapter 19 ships certified for carriage of non-flammable products, oxygen deficiency monitoring shall be fitted in cargo machinery spaces and hold spaces for independent tanks other than type C tanks. Furthermore, oxygen deficiency monitoring equipment shall be installed in enclosed or semi-enclosed spaces containing equipment that may cause an oxygen-deficient environment such as nitrogen generators, inert gas generators or nitrogen cycle refrigerant systems.

LR 13.6-02 Two oxygen sensors are to be positioned at appropriate locations in the space or spaces containing the inert gas system, in accordance with paragraph 15.2.2.4.5.4 of the FSS Code, for all gas carriers, irrespective of the carriage of cargo indicated by an ‘A’ in column ‘f’ of the table in Chapter 19 of the Code.

Existing paragraphs LR 13.6-02 and LR 13.6-03 have been renumbered LR 13.6-03 and LR 13.6-04.

Chapter 18
Operating Requirements

■ *Section 18.10*
Cargo emergency shutdown (ESD) system

18.10.3 ESD system controls

(Table not shown in proposal)

Table 18.1 – ESD functional arrangements

Note 4: The override system permitted by 13.3.7 may be used at sea to prevent false alarms or shutdowns. When level alarms are overridden, operation of cargo pumps and the opening of manifold ESD valves shall be inhibited except when high-level alarm testing is carried out in accordance with 13.3.5 (see 18.10.3.4).

LR 18.10-01 When applying the second sentence of note 4 of *Table 18.1 ESD functional arrangements*, a hardware system such as an electric or mechanical interlocking device is to be provided to prevent inadvertent operation of cargo pumps and inadvertent opening of manifold ESD valves.

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